



Testimony in Regard to Senate Bill 5394 - An Act Concerning Smoke and Carbon Monoxide Detectors and Alarms in Residential Buildings

Submitted to the Committee on Public Safety and Security

**Robert Duval, New England Regional Director and Senior Fire Investigator on
March 6, 2012**

Good Morning. My name is Robert Duval, and I am the New England Regional Director and Senior Fire Investigator for the National Fire Protection Association (NFPA). I am submitting this testimony on behalf of the NFPA to go on record with our opposition to a portion of SB 5394 regarding limiting smoke detection technology to photoelectric type only.

NFPA is the world's leading advocate of fire prevention and an authoritative source on public safety. NFPA develops, publishes, and disseminates more than 300 consensus codes and standards intended to minimize the possibility and effects of fire and other risks. This testimony is to place into the record our support for the use of both types of smoke detection technology; ionization as well as photoelectric.

The two most commonly recognized smoke detection technologies are ionization smoke detection and photoelectric smoke detection.

- Ionization smoke detection is generally more responsive to flaming fires.

How they work: Ionization-type smoke alarms have a small amount of radioactive material between two electrically charged plates, which ionizes the air and causes current to flow between the plates. When smoke enters the chamber, it disrupts the flow of ions, thus reducing the flow of current and activating the alarm.

- Photoelectric smoke detection is generally more responsive to fires that begin with a long period of smoldering (called "smoldering fires").

How they work: Photoelectric-type alarms aim a light source into a sensing chamber at an angle away from the sensor. Smoke enters the chamber, reflecting light onto the light sensor; triggering the alarm.

For each type of smoke alarm, the advantage it provides may be critical to life safety in some fire situations. Home fatal fires, day or night, include a large number of smoldering fires and a large number of flaming fires. You cannot predict the type of fire you may have in your home or when it will occur. Any smoke alarm technology, to be acceptable, must perform acceptably for

both types of fires in order to provide early warning of fire at all times of the day or night and whether you are asleep or awake.

The best evidence has always indicated that either type of smoke alarm will provide sufficient time for escape for most people for most fires of either smoldering or flaming type. However, research is ongoing, and standards are living documents. If at any time, research points to a different conclusion, then that will lead to proposals for changes in the NFPA standard or referenced Underwriters Laboratories product standard for testing and approving smoke alarms. Both organizations currently have task groups looking at smoke alarm performance in the current home environment.

On July 1, 2009, an NFPA task group issued a follow-up report on ionization vs. photoelectric smoke alarms. This report builds on the work of an earlier task group documented in a report on ionization vs. photoelectric smoke alarms released on February 28, 2008. Both task groups were convened to determine the best methods and practices for detecting smoke and to provide information to the technical committee to help determine if changes should be made to the 2010 edition of NFPA 72®, National Fire Alarm and Signaling Code®. I can provide copies of the latest task group report to the committee.

I can also provide the committee with copies of a report from the Smoke Alarm Task Force for the California State Fire Marshal (issued August 2011) which covers "Understanding, Utilization and Effectiveness of Smoke Detection Technology Including Ionization, Photoelectric and other Technologies".

In both cases; for best protection, it is recommended both (ionization and photoelectric) technologies be used in homes. In addition to individual ionization and photoelectric alarms, combination alarms that include both technologies in a single device are available.

I would recommend that Section 29-292(a) 2 be revised to read - ...shall require smoke detection and warning equipment which is installed in such residential buildings shall be tested and certified, pursuant to the requirements of the American National Standards Institute (ANSI) and Underwriters Laboratories Inc. (UL) as set forth in either ANSI/UL 217 or ANSI/UL 268, or successor standards, by a nationally recognized testing laboratory,...

Estimates from NFPA and other agencies show smoke alarm usage in homes rose from less than 10% in 1975 to at least 95% in the year 2000. Over that time period, fire deaths in homes were cut nearly in half. From this we can certainly credit smoke alarm usage as playing a major role in reducing fire deaths. Keep in mind the vast majority of the smoke alarms installed in this period and going forward use ionization technology.

In the period from 2005-2009 smoke alarms sounded in half of the home fires reported to U.S. fire departments. In reported home fires in which smoke alarms were present but did not operate, half had missing or disconnected batteries and one quarter failed due to dead batteries.

NFPA is committed to working with this committee and the fire and building stakeholders within the State of Connecticut on maintaining a safe working and living environment within the buildings of the state.

Thank you for the opportunity to submit this testimony today.

The mission of the international nonprofit NFPA, established in 1896, is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating consensus codes and standards, research, training, and education.

What you should know about SMOKE ALARMS

Smoke Alarms Save Lives

The most important things you need to know are smoke alarms save lives and they should be in every home. Follow these important smoke alarm safety measures:

- **Make sure your smoke alarms are working.** This means testing smoke alarms monthly, replacing batteries once a year or when a low-battery alarm chirps and performing other maintenance as NFPA and your smoke alarm manufacturers recommend. And of course, a smoke alarm disabled because of nuisance alarms provides no protection at all.
- **It is important to have not just one smoke alarm but smoke alarms in every location required by NFPA standards.** (On each level of your home, outside each sleeping area and inside each bedroom.) Tens of millions of U.S. homes are estimated to have smoke alarms but not enough smoke alarms to meet the standards and protect their homes.
- **Interconnect your smoke alarms so that a fire detected by any smoke alarm will sound an alarm at every location where a smoke alarm is installed.** Interconnection can be done using hard-wiring or wireless broadcast technology. Interconnected smoke alarms provide early warning of fires that are still far away or are located on the other side of a door or wall that may block sound.
- **Develop and practice an escape plan so that everyone in the home knows what to do if the smoke alarm sounds.** That includes planning a second way out from every room in your home. Every household that develops and practices an escape plan with two ways out from every location improves its time to escape in every type of fire.

There Are Different Types of Smoke Alarm Technologies—Ionization and Photoelectric

The two most commonly recognized smoke detection technologies are ionization smoke detection and photoelectric smoke detection. Ionization smoke detection is generally more responsive to flaming fires and photoelectric smoke detection is generally more responsive to fires that begin with a long period of smoldering (called "smoldering fires"). For each type of smoke alarm, the advantage it provides may be critical to life safety in some fire situations.

Home fatal fires, day or night, include a large number of smoldering fires and a large number of flaming fires. You can not predict the type of fire you may have in your home or when it will occur. Any smoke alarm technology, to be acceptable, must perform acceptably for both types of fires in order to provide early warning of fire at all times of the day or night and whether you are asleep or awake.

The best evidence has always indicated that either type of smoke alarm will provide sufficient time for escape for most people for most fires of either smoldering or flaming type. However, research is ongoing, and standards are living documents. If at any time, research points to a different conclusion, then that will lead to proposals for changes in the NFPA standard or the closely related Underwriters Laboratories standard for testing and approving smoke alarms. Both organizations currently have task groups looking at smoke alarm performance in the current home environment.

For Best Protection Use Both Types of Smoke Alarm Technologies

For best protection, it is recommended both (ionization and photoelectric) technologies be in homes. In addition to individual ionization and photoelectric alarms, combination alarms that include both technologies in a single device are available.

Nuisance Alarms Can Be Minimized

Ionization type smoke alarms are more susceptible to nuisance alarms due to cooking, the leading cause of nuisance alarms, but both types have some susceptibility to nuisance alarms from cooking fumes, and both have susceptibility to nuisance alarms from the steam from a hot shower.

In the past decade or so, a number of steps have been taken to reduce the likelihood of nuisance alarms, including hush features and refinements to installation rules that include guidance on safe distances from nuisance sources.

TV Demonstrations of Smoke Alarm Performance Can Be Misleading

Informal demonstrations, such as ones done for TV news shows, of smoke alarm performance can seriously mislead the viewer and do not provide a sound basis to assess performance. These demonstration tests are not performed in a controlled or scientific way that compares the time of smoke alarm operation to the time when occupants would be incapacitated. The selected fire scenarios may not be representative of real fatal home fires. Passing or failing a "test" of this sort may have nothing to do with performing well or badly in the wide range of real fires. A valid engineering analysis must select fires that are realistic and analyze them accordingly.

In an informal demonstration, the eye reacts to conditions that look dangerous, mostly visible smoke and visible flame. However, most people are killed by invisible gases, which do not necessarily spread at the same rate as smoke or flame. A valid engineering analysis must measure conditions caused by fires and assess them according to their real danger.

For more information go to www.nfpa.org/smokealarms





Smoke Alarms in Reported U.S. Home Fires



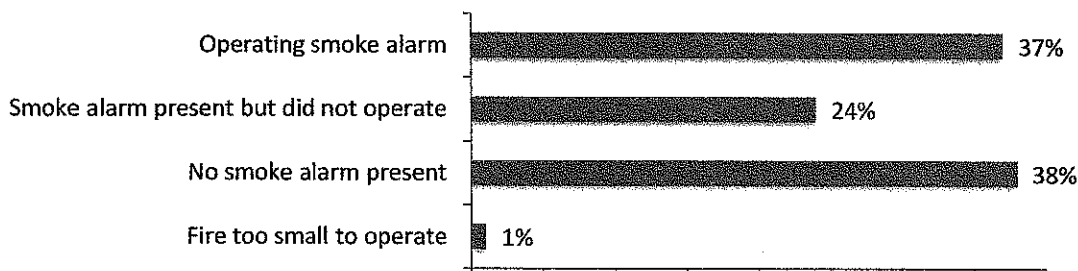
Ninety-six percent of all homes have at least one smoke alarm, according to a 2010 telephone survey. Overall, three-quarters of all U.S. homes have at least one *working* smoke alarm.

Smoke Alarm Presence and Performance

In 2005-2009, smoke alarms sounded in half of the home fires reported to U.S. fire departments.

- Almost two-thirds of home fire deaths resulted from fires in homes with no smoke alarms or no working smoke alarms.
 - No smoke alarms were present in more than one-third (38%) of the home fire deaths.
 - In one-quarter (24%) of the home fire deaths, smoke alarms were present but did not sound.

Home Structure Fire Deaths by Smoke Alarm Performance 2005-2009



Interconnected smoke alarms increase safety

in a Consumer Product Safety Commission (CPSC) survey of households with any fires, including fires in which the fire department was not called, interconnected smoke alarms were more likely to operate and alert occupants to a fire.¹ People may learn about or be alerted to a fire without hearing a smoke alarm.

- When smoke alarms (interconnected or not) were on all floors, they sounded in 37% of fires and alerted occupants in 15%.
- When smoke alarms were not on all floors, they sounded in only 4% of the fires and alerted occupants in only 2%.
- In homes that had interconnected smoke alarms, the alarms sounded in half (53%) of the fires and alerted people in one-quarter (26%) of the fires.

Michael A. Greene and Craig Andrés. 2004-2005 National Sample Survey of Unreported Residential Fires. U.S. Consumer Product Safety Commission, July 2009.



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Homes include one- and two-family dwellings, manufactured homes, apartments, townhouses, roughhouses, and condominiums.

Home Fires with Smoke Alarms

In reported home fires with smoke alarms:

- Half the alarms were powered by battery only.
- Two-thirds of the fatal fire injuries were caused by fires in homes with smoke alarms powered by battery only.

In fires considered large enough to activate the alarm,

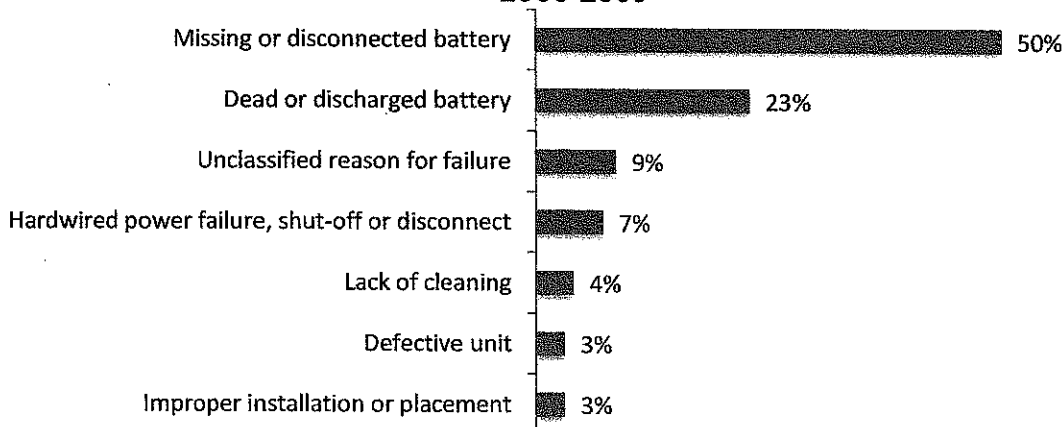
- Hardwired smoke alarms operated 92% of the time.
- Battery-powered smoke alarms operated in three-quarters (77%) of the fires.

Reasons that Smoke Alarms Did Not Operate

In reported home fires¹ in which the smoke alarms were present but did not operate,

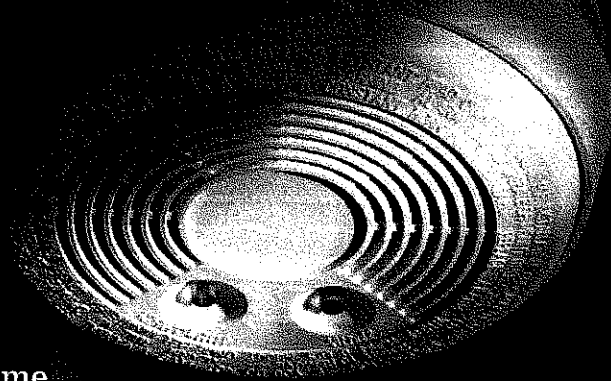
- Half of the smoke alarms had missing or disconnected batteries. Nuisance alarms were the leading reason for disconnected smoke alarms.
- Almost one-quarter (23%) of the smoke alarm failures was due to dead batteries.
- Only 7% of the failures were due to hardwired power source problems, including disconnected smoke alarms, power outages, and power shut-offs.

Reason Smoke Alarm Failed to Operate in Home Structure Fires 2005-2009



Little causal detail is required about certain categories of minor fires, identified by incident type and collectively called confined fires by the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS). Confined fires were omitted from calculations of the reasons for smoke alarm failure.

Smoke Alarm Safety at Home



Smoke alarms are an important part of a home fire escape plan. When there is a fire, smoke spreads fast. Working smoke alarms give you early warning so you can get outside quickly.

SAFETY TIPS

- » INSTALL smoke alarms inside every bedroom, outside each sleeping area and on every level of the home, including the basement.
- » Larger homes may need ADDITIONAL smoke alarms to provide enough protection.
- » For the best protection, INTERCONNECT all smoke alarms so when one sounds they all sound.
- » An IONIZATION smoke alarm is generally more responsive to flaming fires and a PHOTOELECTRIC smoke alarm is generally more responsive to smoldering fires. For the best protection, both types of alarms or combination ionization and photoelectric alarms (also known as dual sensor alarms) are recommended.
- » Smoke alarms should be INSTALLED away from the kitchen to prevent false alarms. Generally, they should be at least 10 feet (3 meters) from a cooking appliance.
- » REPLACE all smoke alarms when they are 10 years old.

FACTS

- ❗ Roughly **two thirds** of home fire deaths happen in homes with no smoke alarms or no working smoke alarms.
- ❗ Working smoke alarms cut the risk of dying in reported home fires in **half**.

AND DON'T FORGET...
All smoke alarms should be tested at least once a month using the test button.



Your Source for SAFETY Information www.nfpa.org/education
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